NATURAL RESOURCES CONSERVATION SERVICE

VIRGINIA CONSERVATION PRACTICE STANDARD

WETLAND CREATION

(Acre)

Code 658

DEFINITION

A wetland that has been created on a site location which historically was not a wetland or is a wetland but the site will be converted to a wetland with a different hydrology, vegetation type, or function than naturally occurred on the site.

PURPOSE

To create wetlands that have wetland hydrology, hydrophytic plant communities, hydric soil conditions, and wetland functions and/or values.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to sites where no natural wetland occurred or where a wetland exists, or existed, and the wetland characteristics (hydrology, vegetation, and functions) will be different from what historically occurred.

Any conversion of existing wetlands is applicable only where they are relatively small, with minimal functional impacts, so that creation will result in a high wetland functional and area gain.

Upon completion of the practice, the site will meet the current NRCS definition of wetland.

This practice is applicable only if hydrologic conditions can be approximated by modifying drainage and/or artificial flooding of a duration and frequency to create and maintain wetland conditions during an average annual precipitation event.

This practice does not apply to *Constructed Wetland (Code 656)* which is intended to treat point and nonpoint sources of water pollution; *Wetland Enhancement (Code 659)* which is intended to rehabilitate a degraded wetland where specific functions and/or values are enhanced beyond original conditions; or *Wetland Restoration (Code 657)* which is intended to rehabilitate a degraded wetland where the soils, hydrology, vegetative community, and biological habitat are returned to original conditions.

CRITERIA

GENERAL

The landowner shall obtain necessary local, state, and federal permits that apply before the practice is applied.

Water rights and water availability are assured prior to creation, if required.

Created wetlands will only be located where the soils, hydrology and vegetation can be modified to meet the current NRCS criteria for wetland.

Establish/maintain vegetative buffers on surrounding uplands to reduce sediment and soluble and sediment-attached substances carried by runoff and/or wind. Buffers are also required to maintain function of a complete biological system.

Document the soil, hydrology and vegetative characteristics of the site and its contributing watershed before alteration.

This standard is for structures with Hazard Class a.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

HYDRIC SOIL CONDITIONS

Hydric soil conditions will be met when wetland hydrology is established.

WETLAND HYDROLOGY

The hydrology of the site is defined by the rate and timing of inflow and outflow, and by the source, duration, frequency, and depth of flooding, ponding, or saturation.

Hydrology may be created by using a variety of measures including but not limited to embankments, surface and subsurface drain plugs, removal/relocation of fill material, soil sealing, pumping, and shallow excavation.

The Virginia Conservation Practice Standards *Pond (Code 378), Dike (Code 356)* and *Structure for Water Control (Code 587)* will be used as appropriate. Refer to the Engineering Field Handbook, Chapters 11, "Ponds and Reservoirs", 13, "Wetland Restoration, Enhancement, and Creation", and 6, "Structures", for additional design information. Existing drainage systems will be utilized, removed, or modified as needed to achieve the intended purpose. See Virginia Conservation Practice Standard *Wetland Restoration (Code 657)* for details about drainage modifications. At least 75% of the surface area will have water depths which vary from 1" to 18" and occur in an irregular pattern. The remaining surface area will have water depths ranging from 18" to a maximum incidental depth of 8'. No more than 10% of the surface water shall have depths greater than 6' deep.

Embankment Design

Seepage Control

Antiseep collars or other seepage control is required if:

1. The conduit is smooth pipe larger than 8 inches in diameter.

2. The conduit is corrugated pipe larger than 12 inches in diameter.

Embankment Top Width

- Low embankments (see below) will have a minimum top width of 4 feet.
- Minimum top widths for small and moderate drainages shall be 6 feet.
- Consider increased top widths to facilitate access and maintenance.

A. Low Embankments

1. Conditions – All must apply:

   a. Three (3) feet or less of fill height from original ground line on the low point of the upstream embankment toe. Measurement shall be made from the top of the plugged channel.

   b. Equal to or less than 100 acres of drainage area.

   c. Equal to or less than 50 acre-feet of storage (to top of embankment).

   d. No downstream hazards.

2. Minimum Design Criteria

   a. Principal spillway sized according to Table 1.

   b. Top of embankment set a minimum of 0.5 feet above principal spillway crest.

   c. The length of embankment, in feet, shall be at least equal to two times (2x) the drainage area, in acres, but not less than 50 feet long. The downstream embankment slope shall be 6:1 or flatter to allow use of the entire embankment as the auxiliary spillway. The embankment must be thoroughly compacted and vegetated.

   d. If the downstream slope of the embankment is steeper than 6:1, the auxiliary spillway shall be sized as listed in Sections B and C below.

   e. The upstream slope of the embankment shall be 6:1 or flatter if the embankment will be subject to overtopping from backwater. Otherwise, the upstream slope shall be 3:1 or flatter.

B. Small Drainage Areas

1. Conditions – All must apply:

   a. Six (6) feet or less of water to auxiliary spillway crest measured from original ground at centerline of embankment. Measurement shall be made from the top of the plugged channel.

   b. Equal to or less than 50 acres of drainage area.

   c. Equal to or less than 50 acre-feet of storage (to top of embankment).

   d. No downstream hazard.

2. Minimum Design Criteria

   a. Principal spillway sized according to Table 1.

   b. Auxiliary spillway crest set a minimum of 0.5 feet above principal spillway crest.

   c. Auxiliary spillway sized to carry the 10-year, 24-hour peak discharge using Engineering Field Handbook, Chapter 11, Exhibit 11-2.1 Retardance C-D*.

   d. Top of embankment set a minimum of 1 foot above auxiliary spillway crest or at the design flow depth in the auxiliary spillway, whichever is greater.

C. Moderate Sized Drainage Areas

1. Conditions – All must apply:

   a. Six (6) feet or less of water to emergency spillway crest measured at original ground at center-line of embankment.

   b. Drainage area between 51 and 99 acres.

   c. Equal to or less than 50 acre-feet of storage (to top of embankment).

   d. No downstream hazard.

2. Minimum Design Criteria

   a. Principal spillway sized according to Table 1.

   b. Auxiliary spillway crest set a minimum of 0.5 feet above principal spillway crest.

   c. Auxiliary spillway sized to carry the 25-year, 24-hour peak discharge using Engineering Field Handbook, Chapter 11, Exhibit 11-2.1, Retardance C-D.*

   d. Top of embankment set 0.5 feet above the design flow depth in the emergency spillway.

NOTE: Any conditions that are outside the limits established in Sections A-C above shall be designed in accordance with criteria for the Virginia Conservation Practice Standard *Pond (Code 378).*

* For sites with good storage conditions, the 25-year peak discharge may be flood routed using TR-55, or equivalent tools, to reduce the size of the emergency spillway.

In lieu of a pipe principal spillway, a spillway lined with erosion resistant material (rock, precast interlocking block, etc.) may be used.

Excavation Design

Excavated wetlands will be 3 ft. or less in depth with a minimum of 75% of the water depth at 1-18 inches. No auxiliary spillway is required.

The material excavated from the pond shall be placed so that its weight will not endanger the stability of the pond side slopes and so that it will not be readily washed back into the pond. Retain some scattered 1 ft. to 2 ft. high mounds of excavated material adjacent to the wetland where it will not cause an erosion hazard.

TABLE 1

Drainage Area	Minimum Riser Diameter	Minimum Inline Stoplog Structure		Minimum Barrel Diameter
Acres	Inches	Width x Depth (Inches)		Inches
0-10	6	8	10	4
11-20	8	14	16	6
21-50	12	24	28	8
51-75	24	N/A	12	
75-99	36	N/A	18	

Riser and barrel must be plastic or smooth steel to use this table. The following pipe is acceptable for embankments less than six (6) feet in height: ASTM F-667 & F-894 (typical of ADS N-12 or Hancor Hi-Q), ASTM D-3033 & D-3034 SDR-35. All pipe supplied shall have watertight joints.

For Section A, Low Embankment Structures: If the pool surface area, at the riser crest, is at 3% of the drainage area, principal spillway requirements may be reduced by one drainage area category. If the pool surface area, at the riser crest, is at least 6% of the drainage area, principal spillway requirements may be reduced two drainage area categories.

For Section B, Small Drainage Areas: If the pool area, at the riser crest, is greater than 5% of the drainage area, principal spillway requirements may be reduced by one drainage area category.

Smaller, inline stoplog structures may be used (8”x10”) for waterlevel control only, in conjunction with a riser and barrel principal spillway meeting Table 1.

HYDROPHYTIC VEGETATION

Establish hydrophytic vegetation typical for wetland type(s) being established.

Native wetland plants with localized genetic material shall be used. Plant materials collected or grown from material collected within a 200-mile radius from the site is considered local.

Where natural colonization of selected species will realistically dominate within 5 years, natural regeneration can be left to occur.

Adequate substrate material and site preparation necessary for proper establishment of the selected plant species shall be included in the design.

If the targeted hydrophytic vegetation is predominately herbaceous, several species adapted to the site shall be established. Herbaceous vegetation may be established by a variety of methods, including mechanical or aerial seeding, topsoiling, and/or organic mats, etc. Vegetation may be established over the entire site, or a portion of the site. Appropriate densities and depths shall be included in the design.

Forested or shrubland wetland establishment shall include a minimum of three species, where applicable. Seedling preparation and planting will follow the criteria of Virginia Conservation Practice Standard *Tree/Shrub Establishment (Code 612)*.

Wetland vegetation shall meet the following criteria for area coverage and density, regardless of whether natural regeneration or planting is used: (1) Herbaceous vegetation shall be designed to achieve a minimum 85 percent area cover of the desired herbaceous species after five years; (2) Woody vegetation shall be designed to achieve a minimum density of 150 trees per acre, 250 trees and shrubs per acre, or 350 shrubs per acre after five years.

WETLAND FUNCTIONS

An assessment or evaluation which addresses the general hydrology, biogeochemical, and habitat functions shall be performed on the site prior to creation.

Created wetland goals and objectives should include targeted natural wetland functions for the wetland type and the site location.

MINIMAL WETLAND SIZE

Minimal surface area size (with water level control) for waterfowl is 4 acres. For amphibians and reptiles, a group of excavated wetlands ranging in size from 100 square feet to ¼ acre, and depths from 1'-3', is optional.

WETLAND BUFFER

A buffer zone at least 35 feet wide (the wider the better) shall be established around the site to protect the wetland. The buffer may consist of an existing, well-vegetated plant community comprised of perennial grasses, forbs, and/or woody species, or a plant community may need to be established either by natural regeneration or by planting. Selection of native plant species to be established in the buffer shall be based on the planned functions of the buffer.

ESTABLISHING VEGETATION

All embankments shall be established in switchgrass at the rate established for the critical area planting practice in the *Plant Establishment Guide for Virginia* plus a nurse crop of ½ bushel of wheat rye. This mix should be established during the normal establishment period of May-June.

Optimum planting results can be made using a drill applied to firm soil conditions. If use of a drill is not practical, broadcast the seed mix to firm soil conditions followed by another firming.

Outside of the normal planting period, noted above, use a temporary cover as indicated below prior to establishing the switchgrass mix:

July 1 – Sept. 1 -- 20 lbs. (1/2 bushel) of German

or Pearl Millet

Sept. 2 – Mid April -- 30 lbs. (1/2 bushel) wheat

NOTE: Wheat may need a herbicide burndown (Roundup) 4-6 weeks prior to planting switchgrass to reduce vegetation and to establish good seed ground contact.

Borrow and spoil disposal areas will be established to any species mix of native warm season grasses listed in the *Plant Establishment Guide for Virginia*. An alternative is to use the conservation cover, orchard grass – ladino clover mix from the *Plant Establishment Guide for Virginia*.

PERMITS

Permits are not required where there is no impact to existing wetlands and streams. Nationwide Permit 27 (Section 404 of the Clean Water Act) authorizes certain activities impacting existing wetlands where there is limited incidental loss and creation results in a net gain of wetlands. Contact the Corps of Engineers and/or Department of Environmental Quality (DEQ) if there are any wetland questions or stream impacts.

EMBANKMENT AND FOUNDATION

The embankment shall be constructed of mineral soils which, when placed and compacted, will results in a stable earth fill. No organic soil shall be used in the embankment. Soils must have high specific gravity and be capable of being formed into an embankment of low permeability. The design of the embankment and specifications for its construction shall give due consideration to the soil materials available, foundation conditions, and requirements for resisting the action of water on the face of the embankment and excessive seepage through the embankment and the foundation.

Foundation Preparation

The foundation area shall be cleared of trees, logs, stumps, roots, brush, boulders, sod, and rubbish. Where needed to establish vegetation, the topsoil and sod are to be stockpiled and spread on the completed dike. Topsoil which is high in organic matter shall be removed. The surface of the foundation shall be thoroughly scarified before placement of the embankment material.

The cutoff trench, where used, shall be excavated to lines and grades as shown on the plans. It shall be backfilled with suitable material in a manner as specified for earth embankments. The necessary compaction shall be obtained by using equipment compatible with site conditions. The trench shall be kept free of standing water during backfill operations. Material from the cutoff trench may be placed within the dike section if suitable for embankment purposes.

Conduit Installation

All conduits through a dike shall be placed on a firm foundation to the lines and grades shown on the plans. Selected backfill material shall be placed in uniform layers around the conduits and their component parts, and each successive layer shall be thoroughly compacted.

Embankment Construction

The material placed in the fill shall be free of detrimental amounts of sod, roots, frozen soil, stones over 6 inches in diameter, and other objectionable material. Fill material shall be placed, spread, and compacted beginning at the lowest point of the foundation and then brought up in horizontal layers of such thickness that the required compaction can be obtained. Layers should be, preferably, six inches but not more than 18 inches thick. The construction equipment shall be operated over the areas of each layer of fill in a way that will result in the required density. Special equipment shall be used when the required density cannot be obtained without it.

The distribution and gradation of materials shall be such that there will be no lenses, pockets, streaks, or layers of material differing substantially in texture or gradation from the surrounding material. Where it is necessary to use materials of varying texture and gradation, the more impervious material shall be placed in the center and upstream portions of the fill.

The moisture content of fill material shall be sufficient to obtain the required degree of compaction.

CONSIDERATIONS

Two or more embankments in series can be used instead of one large embankment to produce a more economical and natural wetland.
Consider effect of volumes and rates of runoff, infiltration, evaporation, and transpiration on the water budget.

Consider the potential for a change in rates of plant growth and transpiration because of changes in the volume of available soil water.

Effects on downstream flows or acquifers that would affect other water uses or users should be evaluated.

Evaluate effects on wetlands or water-related resources and wildlife habitats that would be associated with the practice.

Consider positioning site(s) adjacent to existing wetlands to increase wetland system complexity and diversity, decrease habitat fragmentation, and ensure colonization of the site by wetland flora and fauna.

Consider increased embankment top width to facilitate access and maintenance.

Consider linking wetlands by corridors wherever appropriate to enhance the wetland's use and colonization by the flora and fauna.

The nutrient and pesticide tolerance of the species planned should be considered where known nutrient and pesticide contamination exists.

Effects on temperature of water resources should be assessed in order to prevent undesired effects on aquatic and wildlife communities.

Embankments and excavated slopes should be located and shaped in a manner that is compatible with the existing landscape.

Consider the effects of nearby populations of nuisance/invasive plants and animals.

Evaluate the natural availability of plant species in the soil bank versus the need for planting in the created wetland and upland buffer.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. Specifications shall be recorded

using approved specification sheets or other documentation.

Requirements for the operation and maintenance of the practice shall be incorporated into site specifications.

A plan-profile drawing will be prepared for all jobs. Drawings will be prepared on standard sheets or state approved forms. Information to support design will be recorded in the engineering field book or case file as appropriate. As a minimum, record and maintain the following planning and design data. Include information on either the drawings, approved forms, or in the engineering field book as appropriate:

1. Completed Form VA-EE-1.
2. Location map. Include tract number, field number(s), and acreage in field(s). Include plan view of structure(s) in relation to an identifiable point.
3. Drainage area and soil type.
4. Type of channel plugs needed.
5. Method of spoil disposal.
6. Engineering Layout Surveys.
7. Structures, where applicable.
8. Soil borings, where applicable.
9. Yardage calculations when needed for performance certification.
10. Outlet conditions.
11. Cross-reference to appropriate engineering field books will be made on drawings and plans.
12. Recommendations for vegetation.

As a minimum, record and maintain the following check data:

1. For each design section, record cross-section notes to show grade, bottom width, top width, depth, side slopes, berm width, and spoil banks if specified.
2. Data on all structures installed.
3. Adequacy of outlet.
4. Certification that practice meets standards and specifications. Note any exceptions.
5. A statement that the following have been satisfactorily completed:
   a) Spoil spreading
   b) Seeding or successful establishment of vegetation

All field survey notes and construction check data will be recorded in a standard engineering field book or other approved forms in accordance with Technical Release 62 and Chapter 1, Engineering Field Handbook.

OPERATION AND MAINTENANCE

The following actions shall be carried out to ensure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance):

- Biological control of undesirable plant species and pests (e.g., using predator or parasitic species) shall be implemented where available and feasible.
- Use of fertilizers, mechanical treatments, prescribed burning, pesticides, and other chemicals shall not compromise the intended purpose.
- Establish timing and water control levels required for the maintenance of desired hydrologic conditions and management of vegetation.
- Establish a damage assessment inspection schedule for embankments and structures.
- After allowing two years for establishment, maintain embankment vegetation by cutting every 1-2 years outside of the nesting season (April 1- August 15).
- Haying and livestock grazing will be allowed only where necessary to enhance habitat for rare, threatened or endangered species, (e.g., Bog Turtle). The Virginia Department of

Natural Heritage or Department of Game and Inland Fisheries will be requested to provide a management plan for grazing, haying, or burning.

- Upland buffers will be maintained and managed to enhance wetland functions.

- Periodic cleanout of sediment may be needed, especially for excavated wetlands.

REFERENCES

1. NRCS, Engineering Field Manual, Chapters 6, "Structures"; 13, "Wetland Restoration, Enhancement, or Creation"; and 11, "Ponds and Reservoirs".

2. NRCS, Virginia Field Office Technical Guide.

3. NRCS, *Plant Establishment Guide for Virginia*.

4. GM-190, Part 410, Compliance with NEPA, Subpart A, B, and C, VA Amendment 4. (Includes Form VA-EE-1).

5. 700 Series Construction Specifications.

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WETLAND CREATION

Approved Practice Narrative

(Acre)

CODE 658

658 D1 Wetland Creation: A wetland will be created at the location shown on the plan map. Establish and maintain wetland hydrology (wetness) and vegetation. Design, operation and maintenance plans will be provided as necessary.